

Notice of Allowability

Application No.

10/628,297

Applicant(s)

GRACIAS ET AL.

Examiner

Art Unit

Pamela E Perkins

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed on 7 June 2004.
2. ☒ The allowed claim(s) is/are 1-26.
3. ☒ The drawings filed on 25 July 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____



Michael Trinh
Primary Examiner

ActSPE

DETAILED ACTION

This office action is in response to the filing of the amendment on 7 June 2004.

Claims 1-26 are pending; claims 27-34 have been withdrawn from consideration.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

The application has been amended as follows:

Please Canceled claims 27-34.

Please Amend claim 19 as follows:

19. (Currently Amended) A method comprising:
chemisorbing a protective organic layer selectively onto a portion of
conductive material, wherein the conductive material is in a porous dielectric;[[.]]
sealing the surfaceâ of the porous dielectric; and
desorbing the protective organic layer to re-expose the portion of
conductive material.

Allowable Subject Matter

Claims 1-26 are allowed.

Reasons for Allowance

The following is an examiner's statement of reasons for allowance: prior art does not anticipate, teach, or suggest a method where an interlayer dielectric is disposed on an underlying layer, the underlying layer having an underlying conductor; etching a via and a trench in the interlayer dielectric exposing at least a portion of the underlying conductor; forming/chemisorbing an organic monolayer on the exposed portion of the underlying conductor; lining the surfaces of the interlayer dielectric, so as to line the via and the trench; and removing/desorbing the organic monolayer, re-exposing the portion of the underlying conductor.

For example, Raaijmakers et al. (6,482,733) disclose a method where an interlayer dielectric is formed on an underlying layer, the underlying layer having an underlying conductor; etching a via and a trench in the interlayer dielectric exposing at least a portion of the underlying conductor; forming an organic monolayer on the exposed portion of the underlying conductor; sealing the surfaces of the interlayer dielectric, so as to line the via and the trench with a thin dense film by exposing the surface of the interlayer dielectric to plasma; and forming a barrier layer over the surface of the interlayer dielectric. Raaijmakers et al. further disclose the barrier layer comprises tantalum; the metal conductor comprises copper and the dielectric material comprises an oxide or a polymer. Raaijmakers et al. also disclose forming the organic monolayers by dip-coating, spin-coating or spray on. Raaijmakers et al. disclose the interlayer dielectric comprises dielectric material and pores. However, Raaijmakers et

al. do not disclose, anticipate, teach, or suggest removing/desorbing the organic monolayer, re-exposing the portion of the underlying conductor.

Clem et al. (6,518,168) disclose a method where an interlayer dielectric is formed on an underlying layer, the underlying layer having an underlying conductor; etching a trench in the interlayer dielectric; forming an organic monolayer on the exposed portion of the underlying conductor; sealing the surfaces of the interlayer dielectric and removing the organic monolayer, re-exposing the portion of the underlying conductor. However, Clem et al. do not disclose, anticipate, teach or suggest etching a via and a trench in the interlayer dielectric exposing at least a portion of the underlying conductor; forming/chemisorbing an organic monolayer on the exposed portion of the underlying conductor; lining the surfaces of the interlayer dielectric, so as to line the via and the trench; and removing/desorbing the organic monolayer, re-exposing the portion of the underlying conductor.

The prior art made of record in this action does not anticipate, teach, or suggest a method where an interlayer dielectric is disposed on an underlying layer, the underlying layer having an underlying conductor; etching a via and a trench in the interlayer dielectric exposing at least a portion of the underlying conductor; forming/chemisorbing an organic monolayer on the exposed portion of the underlying conductor; lining the surfaces of the interlayer dielectric, so as to line the via and the trench; and removing/desorbing the organic monolayer, re-exposing the portion of the underlying conductor.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pamela E Perkins whose telephone number is (571) 272-1840. The examiner can normally be reached on Monday thru Friday, 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael Trinh
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